

OPEN SEMINAR

Speaker: Dr. Ranjith Kottokkaran

Department: Microelectronics Research Center, Iowa State University, IA, USA

Title: Perovskite Solar Cells: Vapour deposition

Date: 15th March 2017

Time: 12:00 Noon to 1:00 PM

Place: Samtel Centre Seminar Room

Abstract: Perovskite solar cells are the new frontier in solar cell technology, with the promise of significantly improving the efficiency of Si Solar cells by 50%. Such an increase will lead to a dramatic decrease in the cost of energy produced by solar cells. The traditional way of depositing perovskite solar cells relies on a solution growth process, which is very temperamental and very irreproducible. 99% of the groups who work on perovskite cells use solution growth technique because it is “easy”. However, the structural stability of the perovskite is highly dependent on the residual solvents in perovskites. As there is no solvent involved in the formation of perovskites, the structural stability of the vapour processed perovskites are much higher.

In this talk, I am going to discuss the various vapour deposition techniques for perovskites (PbI₂ and methyl ammonium iodide (MAI) based) that includes sequential and coevaporation process. With the inbuilt multi source evaporator, We could achieve perovskite solar cells with power conversion efficiency of ~17.5%, which is reviewed as one of the best efficiencies ever achieved for a p-i-n vapour deposited cells. In addition to the commonly used MAI based perovskite, we also developed formamidinium iodide based perovskite (FAI) by vapour deposition. We also worked on understanding the device and materials properties of these new materials. The fundamental investigations on material properties of vapour and liquid grown perovskites shows that vapour grown perovskites are much more photo-stable than liquid grown perovskites.

Brief Bio of Speaker: Dr.Ranjith Kottokkaran received his PhD in Materials Engineering from Indian Institute of Science in 2013. During his PhD, he worked in the area of design and synthesis of conjugated polymers for organic electronics application under the guidance of Prof. Praveen C Ramamurthy. After completion of his degree, he worked as a Research Associate at IISc Bangalore for about an year. In 2014 summer he joined as a post-doctoral research associate at Iowa State University, USA. He has been working with Prof. Dalal in the area of Perovskite solar cells for last 3 years. His interests are focussed on the vapour deposited perovskite material. In particular his group is working on the fundamental understanding of the vapour and solution grown perovskite solar cells.